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Space Administration

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Reply to Attn of: OI

JUL 8 1993

Ms. Donna Searcy  
The Secretary  
Federal Communications Commission  
1919 M Street, NW  
Washington, DC 20554

Dear Ms. Searcy:

The National Aeronautics and Space Administration hereby submits comments to the Notice of Proposed Rulemaking to modify regulations affecting the operations of the Search and Rescue Satellite System (SARSAT). General Docket No. RM-8008.

Sincerely,

Charles T. Force  
Associate Administrator  
for Space Communications

Enclosure

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**JUL - 9 1993**

**Before the  
FEDERAL COMMUNICATIONS COMMISSION  
Washington, DC 20554**

**FEDERAL COMMUNICATIONS COMMISSION  
OFFICE OF THE SECRETARY**

In the matter of

Amendment of the Marine Services	)	RM-8008
Rules (Part 80) and Aviation Services	)	
Rules (Part 87) to require registration	)	
of 406 MHz radiobeacons.	)	

**COMMENTS OF THE  
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION**

**Charles T. Force  
Associate Administrator for  
Space Communications  
National Aeronautics and Space  
Administration**

**July 9, 1993**

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## **SUMMARY**

NASA was the developer of the Search and Rescue Satellite (SARSAT) system and has also conducted research that has led, at the present time, to limited use of a search and rescue capability using satellites in the geostationary-satellite orbit. An operational system in geostationary-satellite orbit is expected by 1995 upon the launch of a new series of NOAA geostationary environmental satellites.

Realization of the full life saving potential of both the SARSAT system and the system using satellites in geostationary-satellite orbit requires registration of 406 MHz emergency position indicating radiobeacons (EPIRBs) and emergency locator transmitters (ELTs).

NASA strongly supports adoption of the rule proposed by the Commission to require registration of 406 MHz EPIRBs and ELTs for stations operating in the maritime services and the aviation services, respectively.

**The Commission proposes to require 406 MHz radiobeacons to be registered with**

The NASA response addresses the technical aspects discussed by the FCC in the Notice and makes the following recommendation: NASA highly recommends that registration be required for 406 MHz radiobeacons so that the full potential life saving ability of the current COSPAS-SARSAT system and the future geostationary 406 MHz capability can be realized. The necessity for registration is inherent in the basic characteristics of the transmitted emergency signal and the ability to detect the origin of the transmission by both low orbit satellites and geostationary satellites.

## **II. COSPAS-SARSAT 406 MHZ SYSTEM DESIGN**

NASA's design of the COSPAS-SARSAT 406 MHz system includes features to achieve high reliability and assist search and rescue (SAR) forces to efficiently conduct rescue efforts. Registration of the beacon is a key part of the system design. Reliability is achieved by using multiple short bursts of the data transmission repeated every 50 seconds (normally allowing many more data points than necessary to

### **Typical Location Problems**

In distress situations, various conditions can preclude reception of sufficient transmissions resulting in unlocated distress alerts. Typical reasons for this situation are as follows:

1. Distress conditions, such as a crash with fire, explosion or sudden sinking without release of the beacon, can result in only one or two transmissions before the beacon is disabled.
2. The distress can occur during a satellite pass which can result in an insufficient number of transmissions or a very large location error due to the limited warm-up time of the oscillator.
3. Beacon transmissions can be attenuated by local conditions (such as interfering signals or blockage from terrain or structures) resulting in low power signal reception at the satellite and missed transmissions.
4. A satellite pass can occur near the horizon of the distress location allowing only one or two transmissions to occur before the satellite is out of view. This situation will result in an unlocated alert which can introduce a delay of up to several hours and at times, when an early beacon failure occurs, no further data will be received from the satellite system.

### Registration Requirement:

Registration information allows the SAR forces to take action (beginning with a call to the owner or other point-of-contact provided in the data base) as soon as unlocated alerts are received in the Rescue Coordination Center (RCC). Without registration information, no action is possible thereby resulting in a higher potential for loss of life.

### **III. 406 MHZ GEOSTATIONARY SATELLITE CAPABILITY**

As a follow on to the COSPAS-SARSAT satellite system, NASA has conducted research and development of techniques to provide a capability to detect 406 MHz radiobeacons from geostationary orbit. A geostationary satellite allows immediate detection of distress alerts from anywhere within the field of view of the satellite (approximately one third of the Earth). The capability to detect 406 MHz beacons from geostationary orbit has been demonstrated by NASA using an experimental 406 MHz repeater on the NOAA GOES-7 satellite. The system is currently in limited use by rescue forces and, in fact, has been instrumental in saving a number of lives. Implementation of an operational system is expected by 1995 with the launch of a new series of NOAA geostationary environmental satellites. Other countries, either currently have, or are planning to launch, 406 MHz geostationary repeaters soon, which will result in complete global coverage (except for the polar regions).

### Geostationary Satellite Limitations

The COSPAS-SARSAT low earth orbit system has inherent Doppler location capability due to the relative motion of the satellite with respect to the beacon. Because of the geostationary orbit geometry (its orbit is synchronous with the rotation of the earth)



insufficient relative motion with the beacon is available to generate a Doppler location, thus, all distress messages received result in unlocated alerts.

### Geostationary Detection Results

Proper functioning of the 406 MHz geostationary system depends totally on the availability of registration information. A geostationary alert can save hours in the rescue response time, when its registration data precedes position location information from low earth orbiting satellites. When only a geostationary alert detection is received, due to failure of the beacon before a low orbit satellite is in view, the lack of registration information may make the difference between life and death for potential survivors. Tragically, in such cases, no action can be effectively taken from a geostationary alert by the SAR forces, if the beacon is not registered.

## **IV. NON-DISTRESS ALERTS**

NASA, together with industry and the SAR agencies, has developed radiobeacon specifications to ensure a high degree of reliability in the activation and detection of the beacon in distress incidents. The use of automatically activated distress beacons insures a high probability of activation in a distress, however, they are also subject to activation in non-distress situations. Together with human failures of misuse and improper handling, the number of non-distress activations with 406 MHz EPIRBs has been significant.

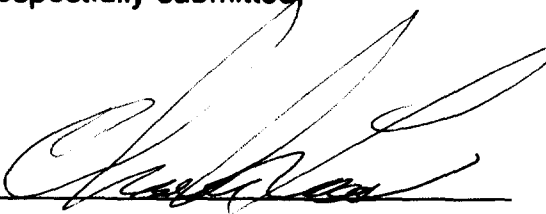
Data gathered from the U.S. Coast Guard by the NOAA Mission Control Center (MCC) has shown that 82% of the non-distress alerts from registered beacons can be handled by the RCC without launching a costly SAR mission. The registration information allows non-distress beacons to be located and silenced using the points of contact contained in the

registration data base. Conversely, when non-distress incident locations are from beacons not registered in the data base, a SAR mission has to be launched to locate and silence the beacon. This expends needless resources, and may divert SAR forces from concurrent valid distress alerts.

## **V. CONCLUSION**

WHEREFORE, because of the vital role that registration of the 406 MHz radiobeacons plays in proper operation of both the COSPAS/SARSAT satellite system and in search and rescue satellite systems that operate from the geostationary-satellite orbit, NASA strongly supports adoption of the rule proposed by the Commission to require registration of all 406 MHz EPIRBs and ELTs.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'Charles T. Force', is written over a horizontal line.

By:

Charles T. Force  
Associate Administrator for  
Space Communications  
National Aeronautics and Space  
Administration

July 9, 1993